

EXPANDABLE DUAL TUBE SCAFFOLD HATCH STRUCTURE

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Field of Invention

This invention relates to scaffolding devices, and in particular, to scaffold decking with access openings therein.

Background of Invention

5 Scaffolding creates platforms that provide a stable and safe structure for working at elevated heights. A scaffold structure includes horizontal members and vertical members that are assembled into a framework. At the desired height, scaffold boards are attached to scaffold structures to create a working platform or working surface. The scaffold boards can be wooden or metal boards that are supported on the structure by horizontal scaffold members. One scaffold
10 system which allows for flexibility in the horizontal position of a scaffold platform is shown in U.S. Patents 5,078,532 and 5,028,164, both to Williams (incorporated herein by reference). The Williams patents show vertical scaffold members with cups placed thereon with latchable horizontal members where the latches interlock the cups on the vertical members. This system, and other, allow for great flexibility in assembly of the scaffold structure and placement of the
15 working surface. Generally, the scaffold structure extends above the deck surface to provide a safety rail system for workers on the deck.

 A common problem with scaffolding is providing a safe means to access the elevated platform. Generally, a worker either climbs the assembled scaffold structure or a ladder is placed on the outside of the platform structure. In either case, the worker uses the exterior of the
20 scaffold structure to access the scaffold working surface with attendant risks. One such scaffold ladder is shown in U.S. Patent 6,415,891 to the applicant (incorporated herein by reference). As the scaffold structure generally extends above the platform working surface, workers either have to climb over the safety rails to access the working surface or the safety rails have to have a gap

in the rail system to allow a worker to pass through the safety rail system. One such system employing an external ladder and a gap in the safety rail system is shown in U.S. Patent Application number 09/767,569 to the applicant. Any exterior ladder, however, presents a risk to the climber - there are no intermediary levels to act as a stop in case of a fall. Other systems have
5 been devised for accessing scaffold decks, including such as scaffold stairs, as shown in U.S. Patent 6,044,930 to the applicant. Scaffold stairs can be cumbersome and heavy and, for a short term scaffold structure, may be more than needed.

Attempts have been made to safely accommodate a ladder in the interior of a scaffold structure. One such method being the placement of a framed opening on a scaffold platform to
10 which a scaffold hatch is placed to allow the opening to be closed. One such scaffold hatch is shown in U.S. Patent 5,746,289 to Williams (incorporated herein by reference). The scaffold hatch, however, is cumbersome and is not designed to support safety rails around the opening.

Summary of the Invention

A scaffold access opening system is provided for accessing the working surface of a
15 scaffold system through an opening in the working surface. The system includes a double barreled horizontal scaffold member which includes two partial horizontal members joined in a vertical relationship to create an upper and lower partial horizontal member, and a third tube which is slidable in the lower tube. The upper horizontal partial member and third tube include an attachment member on the exterior end for attaching to the scaffold frame. The upper partial
20 horizontal member accommodates a vertical stub to which a vertical scaffold member is attached. The double barreled horizontal scaffold member is placed on the scaffold frame to create a dual level to intermediary horizontal member on the scaffold. Short scaffold boards are combined with long vertical scaffold boards in a scaffold frame on the horizontal elevation of the

double barrel horizontal scaffold member to create a working platform with an access opening in the platform. The scaffold frame extends above the working platform. The system is designed to accommodate a safety rail around the access opening by incorporating a portion of the exterior scaffold frame as the safety rail and using an intermediate vertical scaffold member attached to the vertical stub on the double barrel horizontal scaffold member to create the needed internal safety rail/safety gate.

Objects of the Invention

It is an object of the invention to provide an apparatus to allow a worker to safely access a scaffold walking surface.

It is an object of the invention to allow a worker to safely access the walking surface of a scaffold through the interior of a scaffold system.

It is an object of the invention to provide access opening in a scaffold deck that accommodates a safety rail system around the access opening.

It is another object of the invention to provide a double barreled horizontal scaffold member to accommodate an area of partial decking and an area of full decking.

These and other objects, advantages, and features of this invention will be apparent from the following descriptions of the invention.

Brief Description of the Drawings

FIG. 1 is a schematic representation of a scaffold frame.

FIG. 2 is a perspective view of one type of metal scaffold board.

FIG. 3 is a perspective view of a center portion of the double barreled horizontal scaffold member.

FIG. 4 is a perspective view of the installed double barreled horizontal scaffold member.

FIG. 5 is a top perspective view of the scaffold access system installed on a scaffold frame.

FIGS. 6A, 6B and 6C are perspective views of one embodiment of the attachment members.

5 FIG. 7 is a perspective view of the access opening from the underside of the deck surface.

FIG. 8 is a perspective view of a vertical stub showing the sleeve/tab relationship.

FIG. 9 is a perspective view of a detachable vertical stub or detachable short vertical scaffold member.

FIG. 10 is a close up perspective view of the upper tube and vertical stub.

10 FIG. 11 is a perspective view of a scaffold ladder in the scaffold deck opening.

Detailed Description of the Invention

Shown in Figure 1 is a scaffold structure 1 consisting of a series of vertical members 2 and horizontal members 3 assembled to form a frame. A platform 4 is placed on the structure. The platform consists of a series of scaffold planks 5 which rest upon horizontal members.

15 Shown in Figure 2 is a metal scaffold plank 6. The plank shown has a walking surface 7 and "U" shaped brackets adapted to engage a round or circular shaped horizontal scaffold member. The plank shown also has side ears 9 which help stiffen the plank. As shown, the "U" shaped brackets are cut-outs in the side ears 9. Generally, the scaffold frame extends above the scaffold platform or working surface to provide a safety rail to protect workers on the platform.

20 Shown in Figure 3 is the center portion of a double barreled horizontal scaffold member 100. The member has two tubes positioned in a vertical relationship: an upper tube 101 and a lower tube 102, each tube is considered a "partial" horizontal scaffold member, as each tube, in uses, is connectable to the scaffold frame at only one end. Both tubes are shown as circular in

cross-section, but other shapes are possible. The centers of the two tubes are vertically offset a distance D. As shown, the upper tube is vertically aligned with the lower tube, but such is not necessary.

Lower tube 102 is a sleeve in which a third tube, an insert tube 103 slides. The slidable
5 insert tube 103, in combination with the fixed upper tube 101, allows the double barrel horizontal scaffold member 100 to be lengthwise adjustable to allow the double barrel horizontal member to adjust to and bridge a variety of scaffold structure's horizontal dimensions. Lower tube 102 and slidable insert tube 103 are a lower tube assembly. For constant fixed distances, the slidable insert tube 103 could be eliminated, in which case, the lower tube 102 would have an attachment
10 member 110 positioned thereon, next described.

As shown in Figure 4, the double barrel horizontal member 100 includes two attachment members 110 at opposing ends of the upper tube and lower tube: one at the exterior end of the upper tube 101 and one at the exterior end of the lower tube 102. "Exterior end" as used means the end of the tubes which are distal from double barrel structure 100 and attached to the scaffold
15 frame. The attachment members 110 allow the double barrel horizontal member 100 to connect to the scaffold frame, preferably attachment to the horizontal scaffold members 3 on the scaffold frame. One type of attachment member is shown in Figures 6A and 6B. Shown is a clamp, having a first engagement surface 111, and a second engagement surface 112 pivotally attached to the first engagement surface 111 in a clam-shell like construction. The first and second
20 engagement surfaces 111, 112 are adapted to latch around a horizontal scaffold member 3 and be fixed in position by a bolt 113 and nut. As shown in Figure 6C, bolt 113 is pivotally mounted in one engagement surface (here, shown as upper engagement surface 111), and a lower threaded end of the bolt 113 is adapted to engage in an opening or slot 114 positioned in the other

engagement surface. This arrangement allows the attachment member 110 to fixedly clamp to a horizontal scaffold member 3. This clam-shell type clamp will be referred to as a pivotal clamp means; removal of the pivoting clam-shell action (by securing the two sides of the clamping surfaces with bolts or the like) would also serve as a clamping attachment member. Another attachment member would include a channel or cutout (like a "U" shaped cutout of a scaffold board) in the end of the tubes and adapted to engage a horizontal member, either edge on (as in the scaffold boards), or end on, by mounting the U channel perpendicular to the tube. However, such an attachment member is not preferred as there is no latching or clamping structure to resist upward movement of the engaged attachment member.

If the double barreled horizontal member 100 is to attach to a vertical scaffold member, various attachment members are possible, such as the Williams latch.

As can be seen, the attachment member 110 on the insert tube 103 is vertically offset upwards a distance from the center-line of the insert tube 103 (also shown in Fig 6B). The offset distance (measured vertically from the center of the attachment member 110 to the center of the lower tube 102) is distance D, the same distance by which the upper tube 101 is vertically offset from the lower tube 102. This vertical offsetting allows for vertical alignment of the attachment members 110 on the insert 103 and upper 101 tubes when attached to a scaffold frame so that both the upper tube 101 and lower tube 102 are level surfaces (that is, not tilted vertically) with respect to the horizontal scaffold members of the scaffold frame.

The offset distance "D" should be at least equal to the length of the side ears 9 on a metal scaffold plank 6. This distance allows the scaffold planks 6 (with side ears) to be placed across the upper 101 of the double barrel horizontal member 100 without interfering with the lower tube 102, as shown in Figure 7. If the lower tube 102 diameter is smaller than that which would result

in the desired offset distance, the lower tube 102 can be mounted to the upper tube 101 through a plate or plates 115 welded between the two tubes, as is shown in Figure 3. To reduce weight, the lower tube could be a series of rings or short cylindrical pieces suspended below the upper tube to provide a mount for the insert tube to slide in (not shown). These rings or short cylindrical pieces should be of sufficient quantity to prevent the double barreled horizontal scaffold member from flexing in response to a downward force; that is, to allow the combination upper and lower (and insert) tubes to function substantially as a rigid single tube when installed.

As shown in Figure 3, near the interior end 99 of the upper tube 101 is an outwardly projecting member 98, in this instance, a plate or plates. These plate(s) 98 are adapted to "block" scaffold boards 5 engaged on the upper tube from sliding off the interior end of the upper tube.

Also positioned near the interior end 99 of the upper tube 101 is a vertical stub 120. Vertical stub 120 is adapted to engage a short vertical scaffold member 200 (about 4 feet in length). Vertical stub 120 is a short 3-6" sleeve over which a vertical scaffold member 200 is slid. Vertical Stub 120 is shown in "dashed" outline in Figure 3, as the short vertical scaffold member 200 is shown inserted over the vertical stub 120. Vertical stub 120 includes a button latch 121 in the stub's sidewalls adapted to engage an opening in the side walls of a vertical scaffold member 200 to latch the vertical stub 120 to the vertical scaffold member 200. Vertical stub 120 could be an oversized tube into which the vertical member 200 is inserted, (as opposed to inserting the stub into the vertical member) in which case, if a button latch is used, the button latch 121 must be located on the vertical scaffold member and aligning openings positioned in the vertical stub. Other means could be employed for latching the vertical stub 120 to a vertical scaffold member, such as a hitch pin, bolt, etc. In another embodiment, vertical stub 120 is an integral upstanding vertical scaffold member 200 (e.g. a upstanding vertical member welded onto

upper tube 101); however, an integrated horizontal/vertical member (a "T" shaped scaffold member) is not preferred due to the bulkiness of this embodiment for shipping purposes.

As shown in the detail of Figure 10, vertical stub 120 is welded to the top tube. An alternative embodiment could include a detachable vertical stub 120, such as a stub having an attachment member on its base, such as the pivotable clamp means 900 as shown in Figure 9, or two such pivotable clamp means positioned on opposite sides of the stub (when employing a pivotable clamp means, the top and bottom tube should be joined by a vertical plate, where the plate is lacking or cutout in the area where the vertical stub 120 is attached to the upper tube 101 to allow the pivotable clamp means to encircle the upper tube 101). Alternatively, the upper tube 101 could incorporate a sleeve 300 on its top surface, where the detachable stub has a corresponding respective tab 301 or sleeve insertable into the corresponding structure on the upper tube, such as shown in Figure 8. These are collectively referred to as a means for attaching a vertical scaffold member.

To create a scaffold deck 201 with an opening at a particular horizontal level, the double barrel horizontal tube 100 is adjusted to bridge across the scaffold frame at the desired horizontal level. As shown in Figure 4, the double barrel horizontal member 100 bridges across the frame and engages horizontal members 3 in the scaffold frame creating an intermediary horizontal scaffold member. In the embodiment shown, the double barrel horizontal scaffold member 100 is positioned about 3.5 feet inside one of the vertical walls of the scaffold frame (the reference vertical wall 16). Short scaffold planks 221 are then installed across the upper tube 101 of the double barrel horizontal scaffold member 100 to a horizontal member on the scaffold vertical wall 17 opposite the reference vertical wall 16. As shown in Figure 5, long scaffold boards 222 are then placed parallel to the short scaffold boards 221, but extending between the reference

vertical wall 16 and the opposing vertical wall 17. These long scaffold boards 222 pass over the lower tube 102 of the double barrel horizontal scaffold member 100. This arrangement of scaffold planks creates a platform with an access opening 225 in a corner of the scaffold working deck. As shown in figure 5, the access opening 225 has two interior sides without a safety railing, and two exterior sides where the scaffold frame acts as a safety rail.

To create a safety rail system on the access opening 225 interior sides, a short vertical scaffold member 200 (about 4 feet in length) is positioned and locked on the vertical stub 120 of the upper tube 101 thereby forming an intermediate vertical member (intermediate in the sense that it is positioned internally to the scaffold structure, and the vertical member does not extend to the ground level). As shown in figure 5, the vertical scaffold member 200 has a series of cups 30 vertically positioned thereon. Short horizontal scaffold members 227 are then joined between the horizontal scaffold members 3 (which form the safety railing) and the intermediate vertical member 225, thereby creating a safety railing across one of the open sides of the access opening 225. The short horizontal members 227 utilized have a horizontal member with two ends with a latch adapted to engage a cup positioned on one end, and on the opposite end, the pivotable clamp means.

On the remaining open side of the access opening is placed a safety gate 230, shown in Figure 5. Safety gate 230 is a pivoting spring loaded gate which is clamped to a short vertical member 231, which short vertical member 231 is then clamped between horizontal members 3 as shown in Figure 5. Finally, a ladder 400 is positioned in the opening to allow access to the opening, preferably the ladder has a clamp such as the ladder clamp shown in U.S. Patent 6,415,891, or hooks 600 to engage/clamp the ladder to the scaffold structure, as shown in Figure 11. Alternatively, if the horizontal members of the scaffold frame are placed suitably, a separate

ladder can be eliminated by employing the scaffold frame's horizontal members as the ladder's rungs. With this assembled structure, an opening is created in a scaffold deck which is fully protected by safety railing and the opening is accessible through the interior of the scaffold structure by a ladder. With multiple deck structures, openings can be created in each deck to allow
5 a worker to freely move about the scaffold's decks through interior access alone.